

PATENT SPECIFICATION

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746,655



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COMPLETE SPECIFICATION

Improvements in and relating to Gyratory Crushers

We, NORDBERG MANUFACTURING COMPANY, a Corporation organised under the laws of the State of Wisconsin, United States of America, of 3073, South Chase Avenue, Milwaukee, Wisconsin, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to gyratory crushers and more specifically to bowls and bowl liners for use therein.

When it is desired to alter the size or shape of the crushing cavity in such crushers for the purpose of enabling a different kind of material to be crushed or for giving different treatment to the same kind of material, it is usual to remove the bowl and replace it by one having a bowl liner of the desired size or shape.

This removal and replacement of the entire bowl is inconvenient in practice as it entails maintaining a stock of bowls each of which is a comparatively bulky and expensive item. The aim of the present invention, therefore, is to make it necessary to replace the bowl liners only despite their different size and shape and the consequential difficulty of mounting them on the same bowl.

According to the invention, this aim is achieved by providing the bowl liner, which is frusto-conical in shape and made in one piece, with ten or more outwardly-extending spaced-apart lugs arranged round its upper peripheral edge for supporting the liner on the bowl, the lugs lying substantially in the same horizontal plane and having outer edges which do not extend beyond the lower peripheral edge of the liner.

In the best construction, the bowl liner is not attached directly to the bowl but has an adapter ring connected to the liner by a corresponding number of inwardly-extending

lugs on the ring adapted to pass through the spaces between adjacent lugs on the liner and to engage the undersides of the lugs on the liner and be held in the engaged position by a removable locking member. The adapter ring can be fastened to the bowl by means of inter-engaging screw threads on the ring and the bowl.

In order that the invention may be thoroughly understood, a gyratory crusher incorporating it will now be described by way of example with reference to the accompanying drawings in which:—

Figure 1 is a vertical section through the crusher;

Figure 2 is a partial plan on an enlarged scale of the bowl and liner shown in Figure 1;

Figure 3 is an enlarged section through the line III—III in Figure 2;

Figure 4 is an enlarged section through line IV—IV in Figure 2;

Figure 5 is a perspective view of a detail; and

Figure 6 is a vertical section through part of a crusher having a different form of bowl liner from that shown in Figure 1.

The crusher shown in Figure 1 comprises a main frame 10 having a flange 12 at its upper end which supports a bowl-supporting ring 14 having an internal screw thread which engages with a corresponding external screw thread on the bowl 16. The latter is provided with a generally frusto-conical, one-piece bowl liner 18.

The lower, gyrated crushing member comprises a conical head 20 having a mantle 22 and a substantially vertical shaft 24 which is gyrated by an eccentric sleeve 26 mounted for rotation in a bearing sleeve 28. The eccentric sleeve 26 is driven by a driving shaft 30 through pinions 32 and 34 mounted on the shaft 30 and the upper end of the eccentric sleeve 26 respectively. The weight of the crushing head is taken by the bearing 36 and

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the head carries a feed plate 38 at its upper end which receives the material to be crushed through the hopper 40.

In order that the bowl may yield should uncrushable material such as tramp iron finds its way into the crushing cavity 42, the ring 14 is not pressed positively against the flange 12 but by springs 44 arranged round the main frame 10 of the crusher. If desired, pneumatic cylinders and pistons can be used to achieve the same result.

The actual construction of the bowl and bowl liner will now be described in some detail.

The bowl comprises an inner, conical portion 46 on which the bowl liner 18 is mounted and a cylindrical portion 48 surrounding and connected to the conical portion 46 at its lower edge. The two portions 46 and 48 are also connected to each other by a number of evenly-spaced radial ribs 50.

The bowl liner 18 has a lower surface 52 in contact with an opposed lower surface 54 on the portion 46 of the bowl. The upper peripheral edge of the bowl liner is provided with ten or more outwardly-extending spaced-apart lugs 56 and these serve to support the liner on the bowl through the intermediary of a locking or adapter ring 58 having an external screw-thread 60 (see Figure 3) which engages a corresponding screw-thread 62 on the portion 46 of the bowl. The distance between adjacent lugs 56 is about the same as their width and they have a flat undersurface lying substantially at right angles to the longitudinal axis of the liner. The outer edges of the lugs do not extend beyond the lower peripheral edge of the liner and the lugs all lie in the same horizontal plane. The adapter ring 58 also has a corresponding number of inwardly-extending lugs 64 (see Figures 2 and 3) which are passed through the spaces between adjacent lugs on the liner so as to engage the undersides of the lugs 56 on the bowl-liner and be held in the engaged position by a T-shaped locking member 66 (see Figure 5). Thus, rotation of the adapter ring 58 relatively to the bowl portion 46 is effective to draw the surface 52 on the bowl liner 18 upwardly into contact with the opposed inner surface 54 on the bowl.

When the bowl liner has been properly positioned on the bowl, the free space between the outer surface of the liner and the inner surface of the bowl portion 46 may be filled with lead or other backing metal 47 through the spaces 68 between the lugs 56 and 64. For ease in tightening, the adapter ring 58 has a number of upwardly-extending projections 70 in its upper edge to which a tool may be applied. The projections 70 are unevenly spaced so that a tool can be engaged with one of them and use be made of one of the evenly-spaced ribs 50 as a fulcrum for the tool.

Figure 6 shows part of a so-called short head cone crusher. The head 20 carries a relatively short mantle 22, and the bowl 16 carries a correspondingly short liner 18. Because of this, the lugs 64 on the adapter ring 58 are provided at its lower edge instead of at its upper edge as in Figures 3 and 4.

It will be seen therefore, that by making it a relatively simple matter to remove and replace different kinds of bowl liner, it is not necessary to stock entire bowls having different bowl liners as has been the custom in the past.

What we claim is:—

1. A generally frusto-conical one-piece bowl liner for gyratory crushers having ten or more outwardly-extending spaced-apart lugs arranged round its upper peripheral edge for supporting the liner on the bowl, the lugs lying substantially in the same horizontal plane and having outer edges which do not extend beyond the lower peripheral edge of the liner. 80

2. A bowl liner according to Claim 1 in which the lugs are spaced apart evenly. 90

3. A bowl liner according to Claim 1 or Claim 2 in which the distance between adjacent lugs is about the same as their width. 85

4. A bowl liner according to any preceding claim provided with an adapter ring for fastening the liner to the bowl, the said ring having a corresponding number of inwardly-extending lugs adapted to pass through the spaces between adjacent lugs on the liner and to engage the undersides of the lugs on the liner and be held in the engaged position by a removable locking member. 95

5. A bowl for gyratory crushers having a liner and adapter ring according to Claim 4, the adapter ring being provided with a screw-thread on its outer surface which engages a corresponding screw-thread on the bowl. 105

6. A bowl according to Claim 5 in which the main part of the bowl and the liner make contact with each other only at the lower outer surface of the liner. 110

7. A bowl according to Claim 5 or Claim 6 comprising a conical portion on which the liner is mounted and a cylindrical portion surrounding and connected to the said conical portion at its lower edge, in which the conical and cylindrical portions of the bowl are also connected to each other by a number of radial ribs each of which can be used as a fulcrum for a tool when it is desired to screw-up or unscrew the adapter ring on the bowl. 115

8. A bowl according to Claim 7 in which the adapter ring is provided with a number of projections on its upper edge with which a tool bearing against one of the radial ribs of the bowl can be engaged. 120

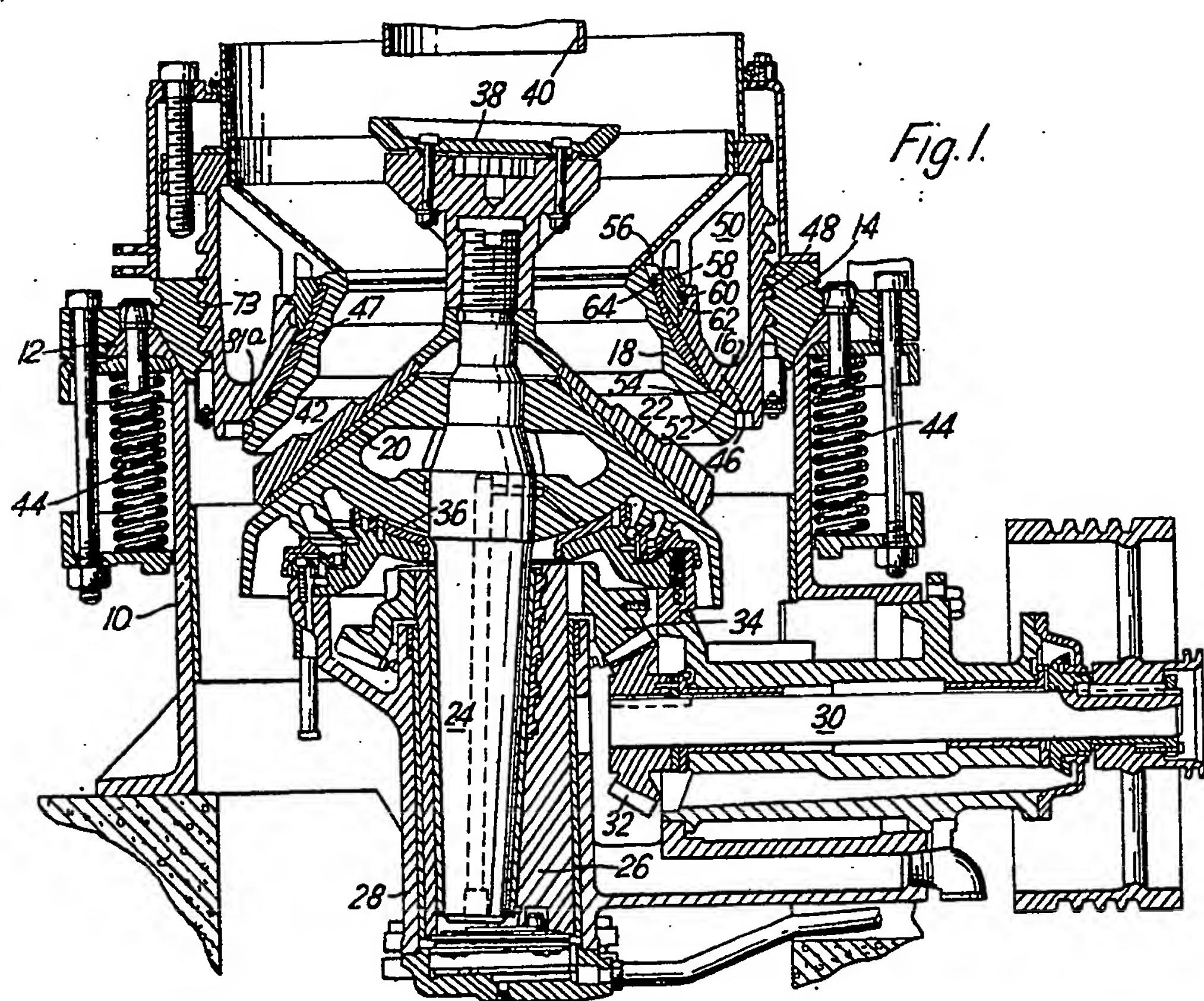
9. A bowl according to Claim 8 in which the circumferential spacing of the projections on the adapter ring is different from the spacing of the radial ribs on the bowl. 125

130

10. A bowl liner substantially as described
with reference to the accompanying drawings.

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Fig. 2.

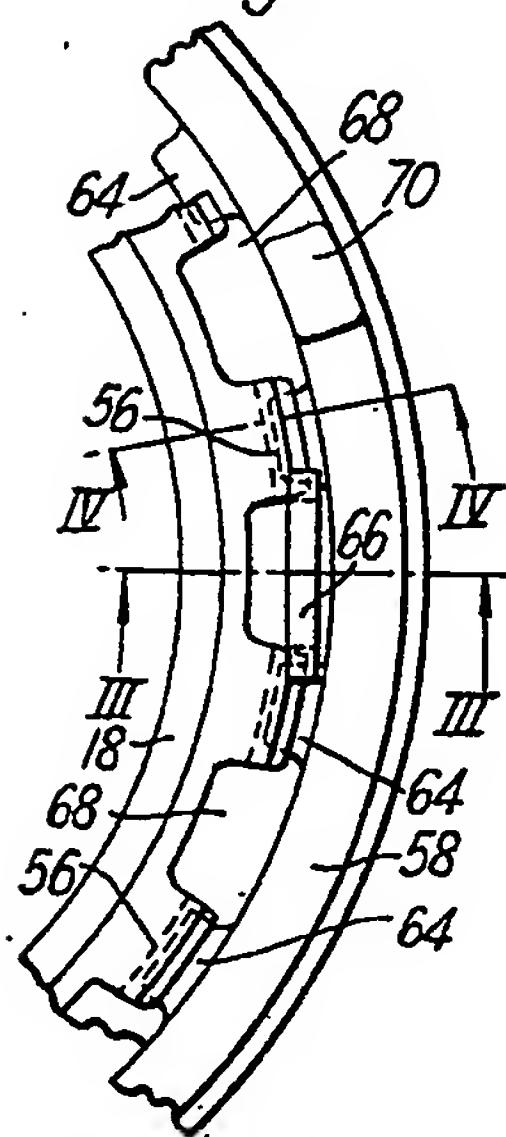


Fig. 3.

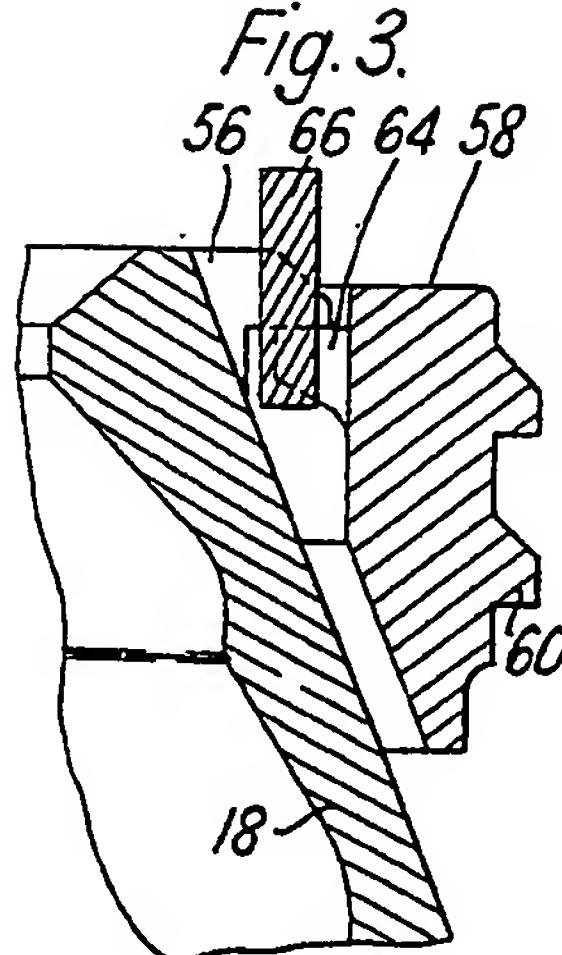


Fig. 4.

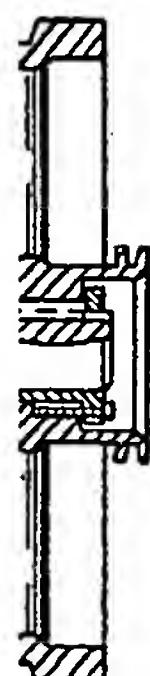
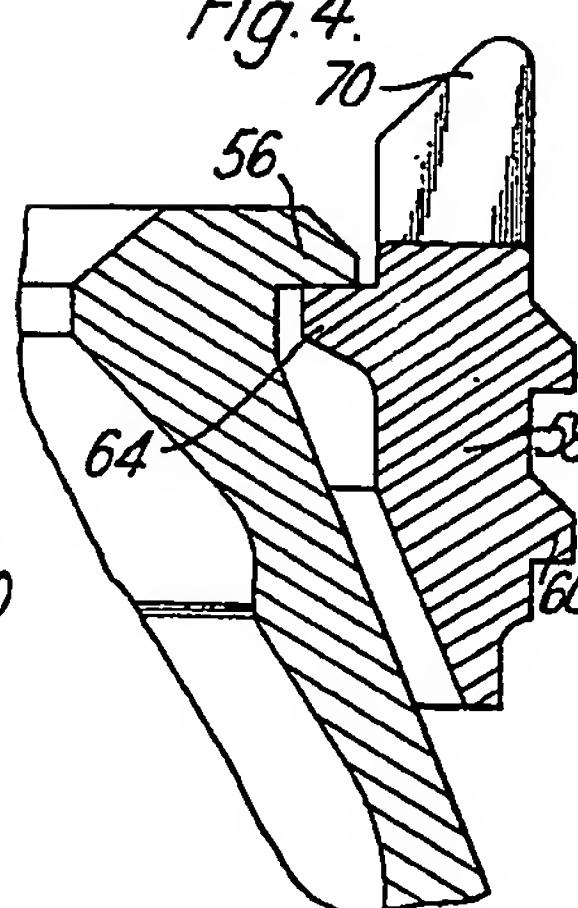
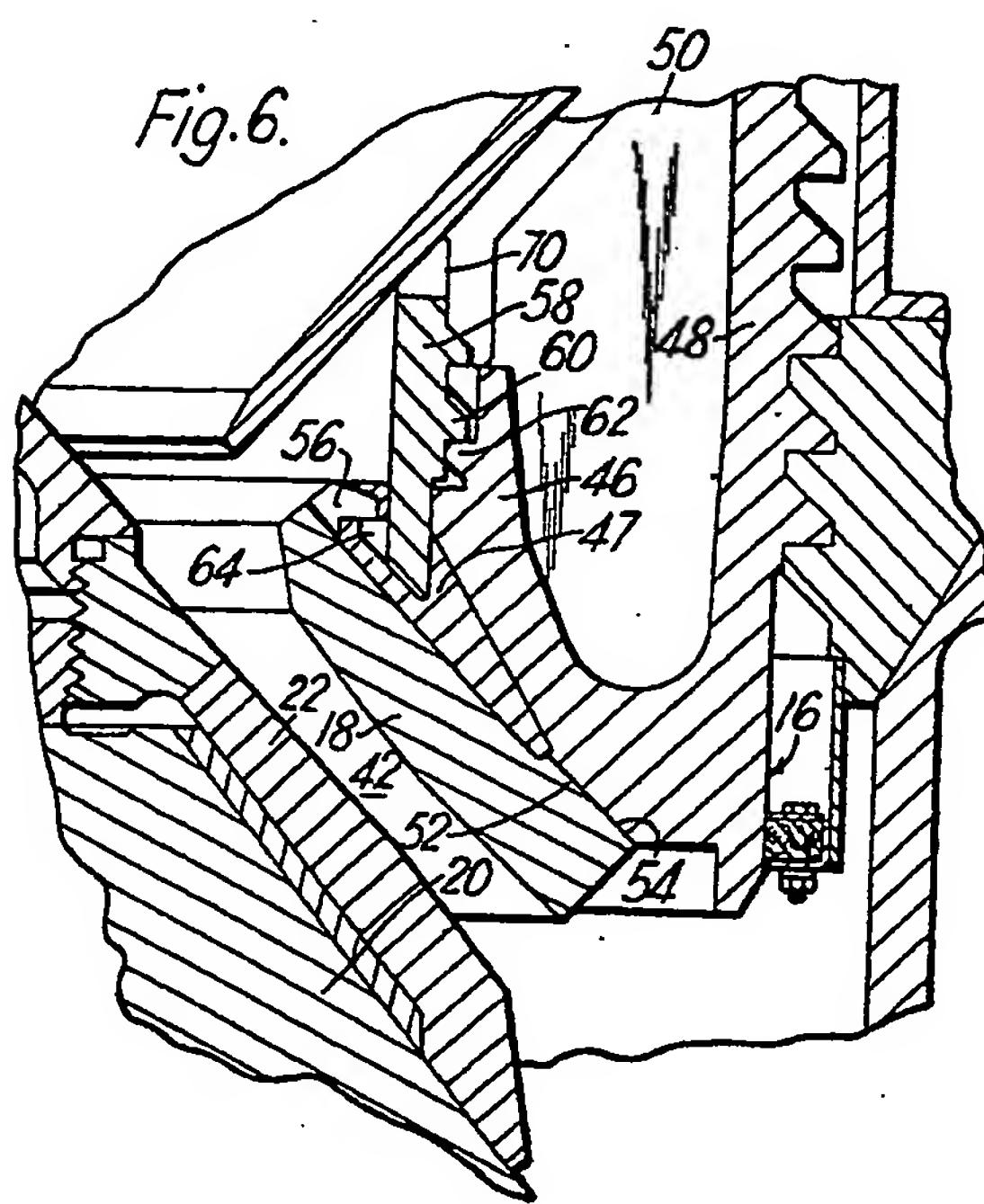


Fig. 5.



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